Introduction to Global Positioning Systems

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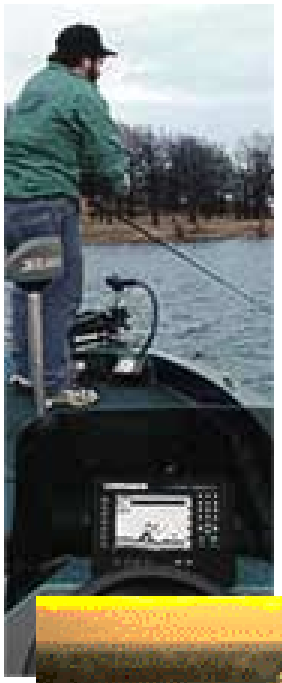
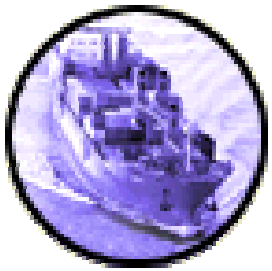
Agenda

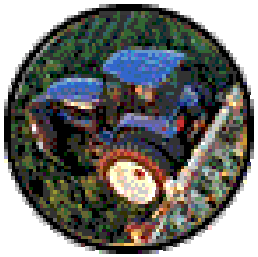
- Overview of GPS
- Overview of Magellan 315
- “How To”

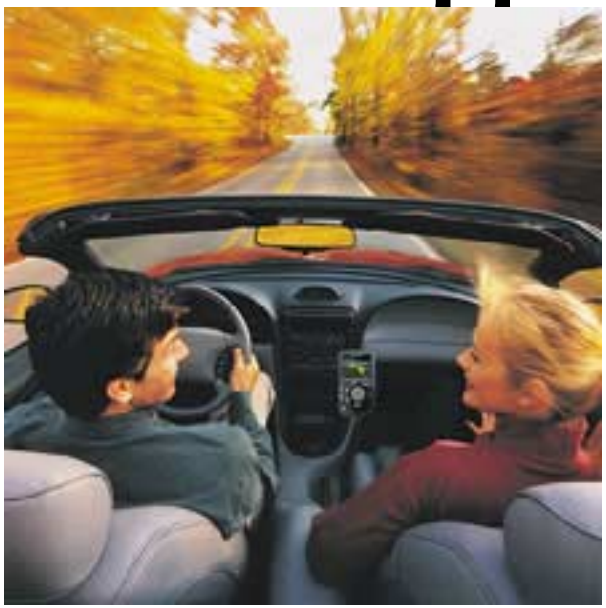
What is GPS?

GPS Comes in All Shapes and Sizes for All Kinds of Applications





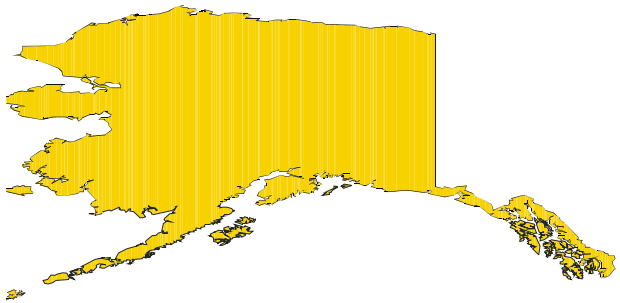




Commonly Used Terms

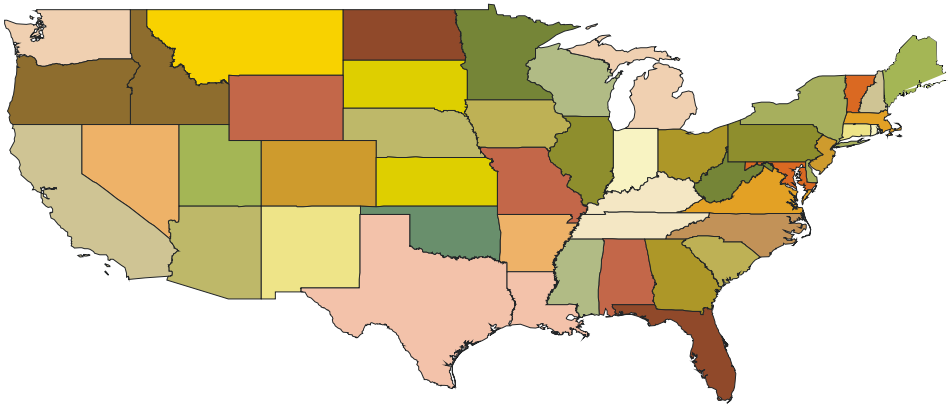
- Datum – the "basis" for mapping;
- Latitude/Longitude – spherical coordinates for determining locations on the earth's surface;
- Projections – changing spherical coordinates to a Cartesian or "flat" coordinate system (i.e., UTM, State Plane feet, etc.);
- Accuracy – in general, how close measured coordinates are to the "true" coordinate;
- Precision – the "spread" or variation in repeated location coordinates;
- Differential Corrections – improving the accuracy and precision of standard GPS data using additional information.

Bad lAtitudes



•Lat/Long great for locating a position on earth;

•Lat/Long lousy for displaying that day in a meaningful way on flat maps (electronic or paper).



•Projections allow us to convert lat/long into something more meaningfully displayed.

Basic GPS Functionality

• Determining the position, or latitude and longitude of landmarks or way points;

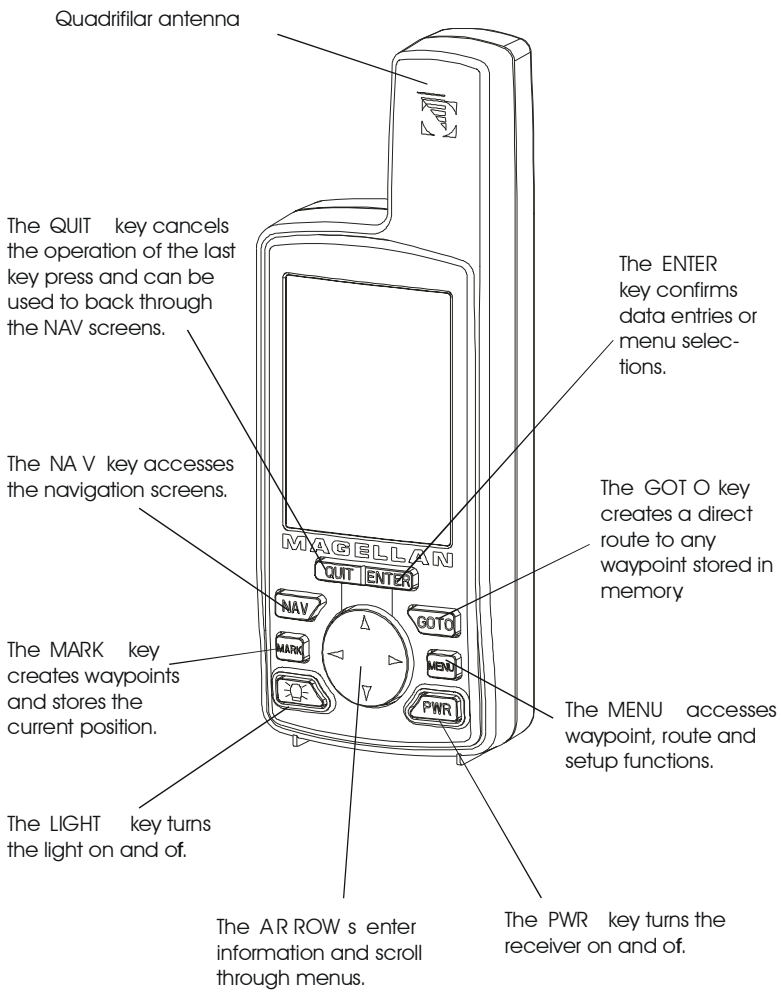
• Finding landmarks or way points given their latitude and longitude;

• Working with routes/tracks/paths.

Magellan GPS 315

- Approximately $150;
- 15 hours on two AA batteries;
- Up to 500 waypoints/landmarks;
- Up to 20 routes with 30 “legs” per route;
- Automatic track generation;
- Automatic position averaging;
- Support uploading and downloading data to a PC;
- Differential GPS enabled.

GPS 315 Overview

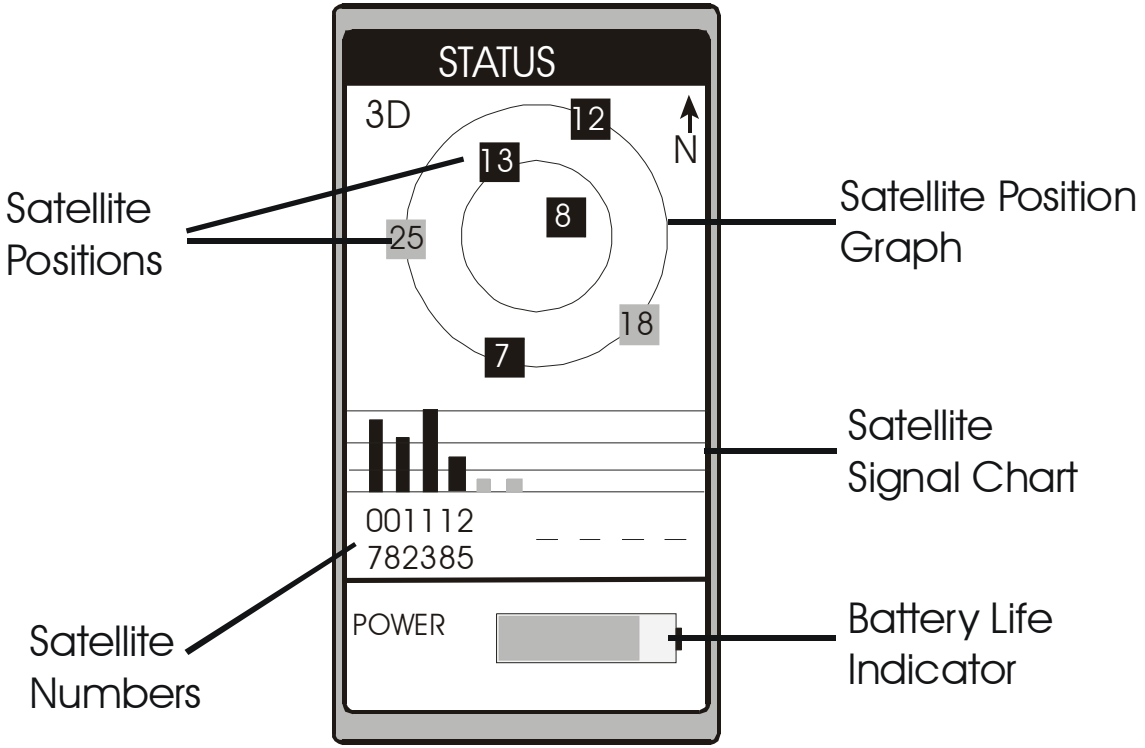


- **PWR** turns unit on/off;
- **NAV** switches between primary screens;
- **MENU** provides access to menus specific to the various screens;
- **ENTER** confirms data entries or selects menu items;
- **MARK** stores a landmark;
- **GOTO** finds a selected landmark.

GPS 315 Abbreviations

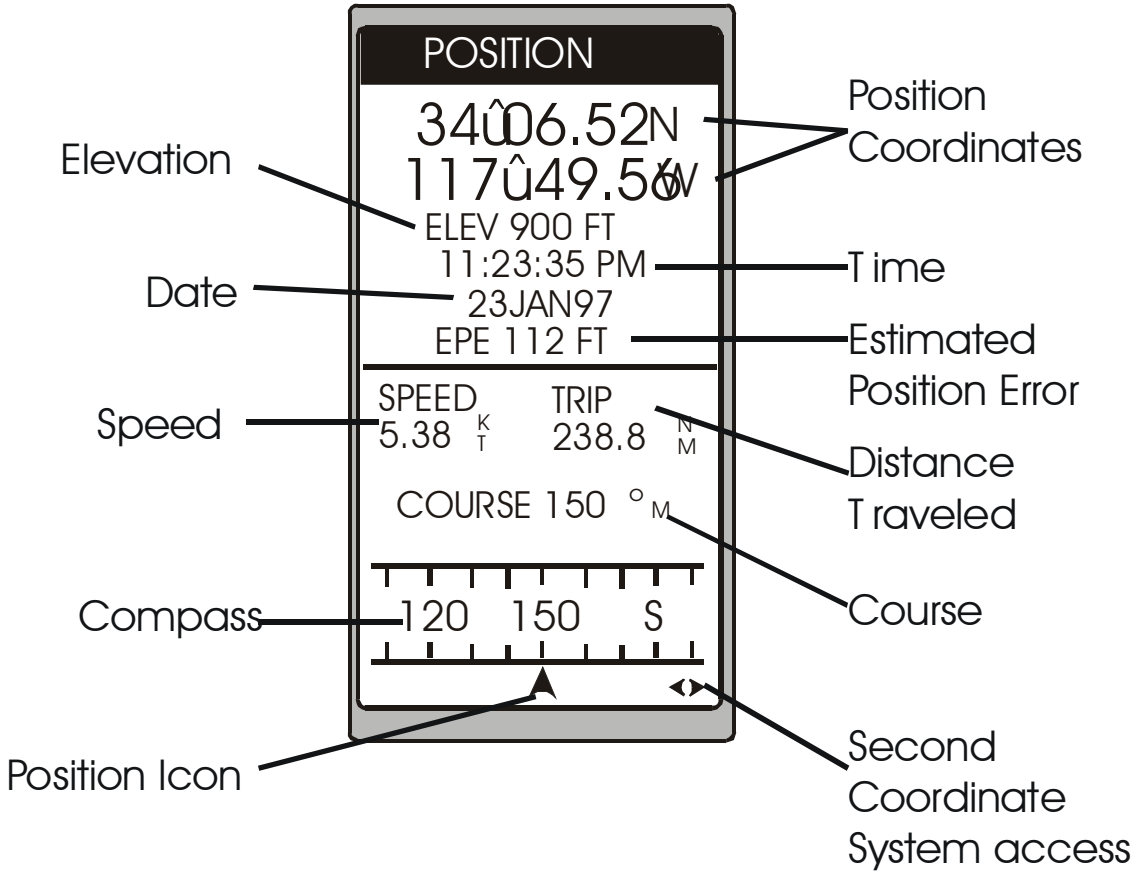
- BRG - Bearing
- COG - Course Over Ground
- CTS - Course to Steer
- DST - Distance
- ETA - Estimated Time of Arrival
- ETE - Estimated Time Enroute
- HDG - Heading
- LAT/LON - Latitude/Longitude
- LMK - Landmark
- SOG - Speed Over Ground
- TRN - Turn (degrees)
- TTG - Time To Go
- UTC - Universal Time Coordinated
- UTM - Universal Transverse Mercator
- VMG - Velocity Made Good
- XTE - Cross Track Error

Status Screen



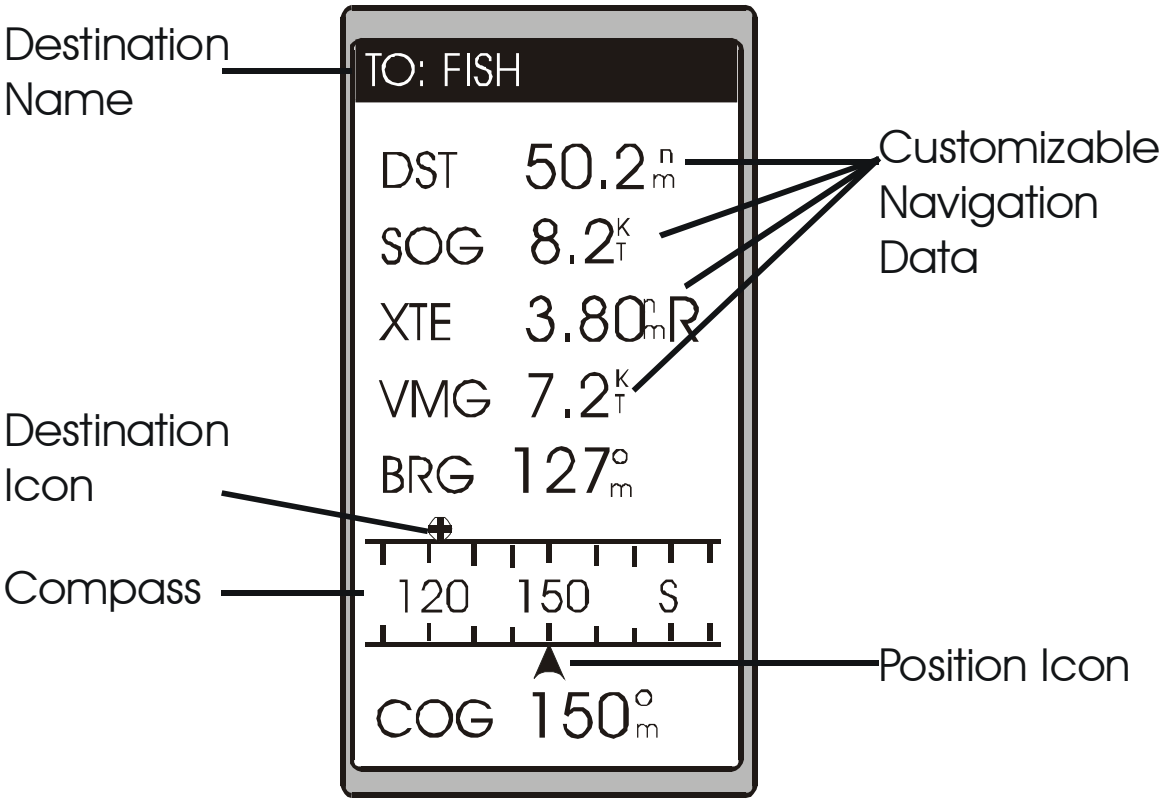
The status screen shows the availability of satellites. The top of the screen shows the relative position of satellites overhead. The middle portion shows the strength of signal. The bottom shows battery status.

Position Screen



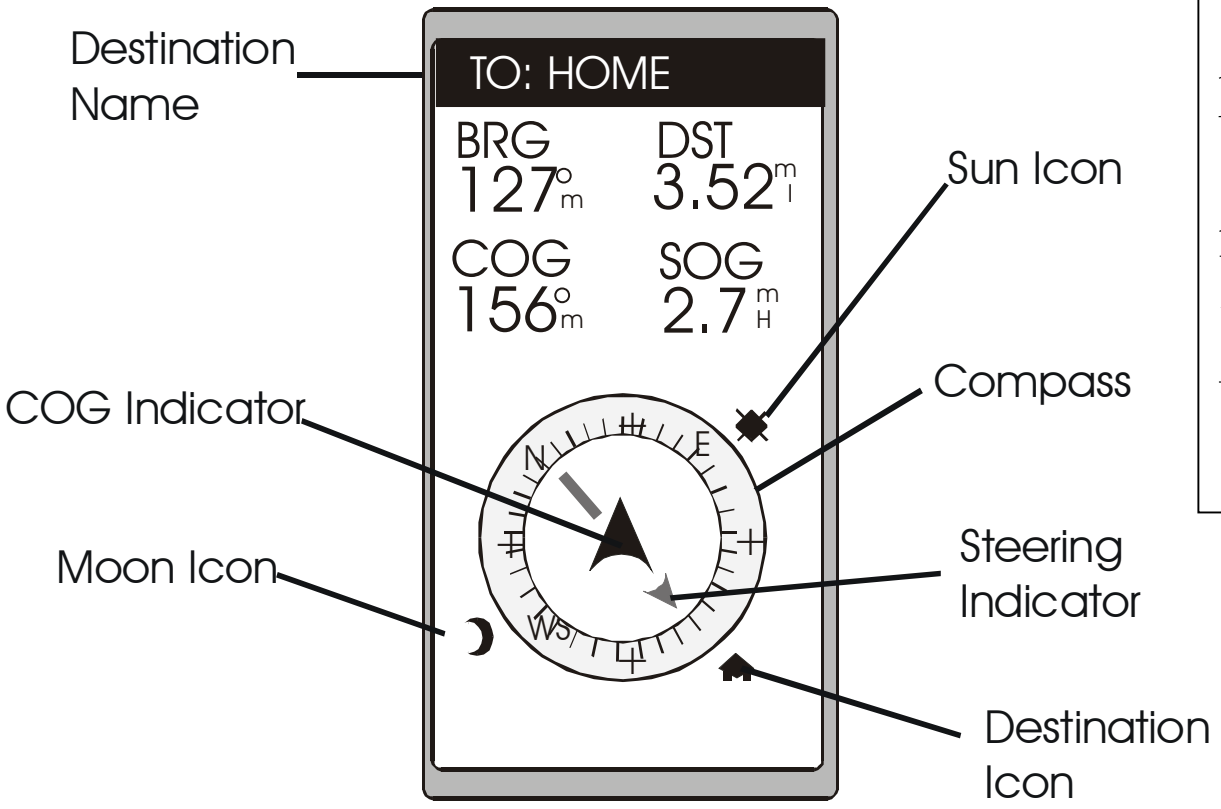
The position screen shows the current location, along with elev., date, time and position error. The middle tracks speed and distance traveled, along with course. The bottom shows the compass bearing, ***calculated from existing data.***

NAV1 Screen



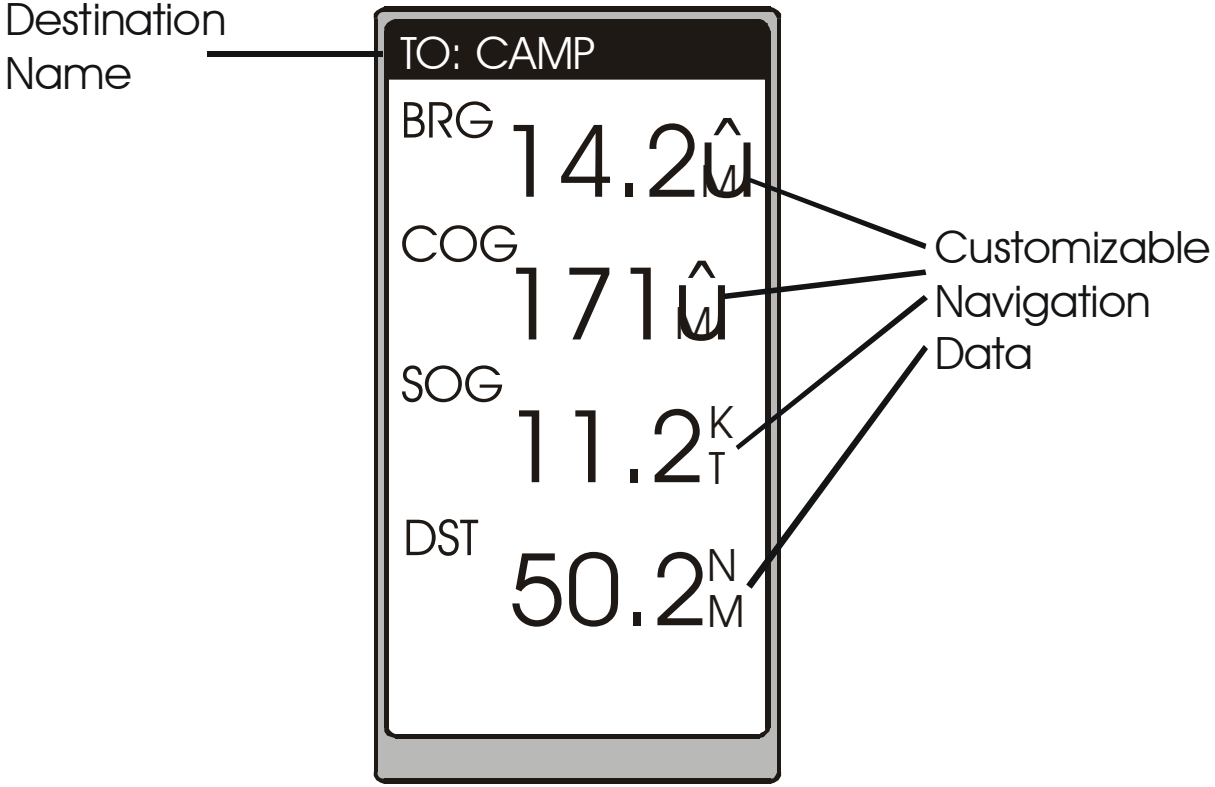
The first navigational screen shows customizable navigation information…useful for "finding" way points or landmarks that have been chosen as destinations.

Compass Screen



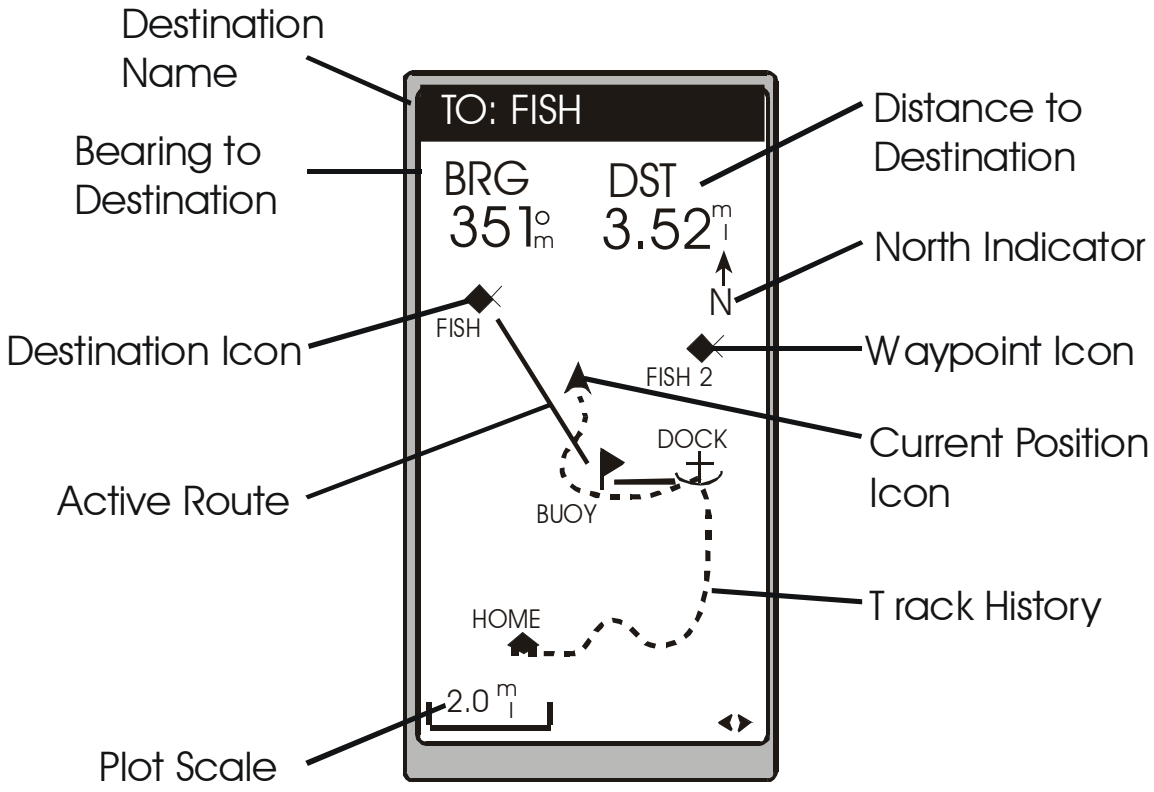
The compass screen provides an alternative, customizable navigational information. Also useful for finding destinations.

NAV2 Screen



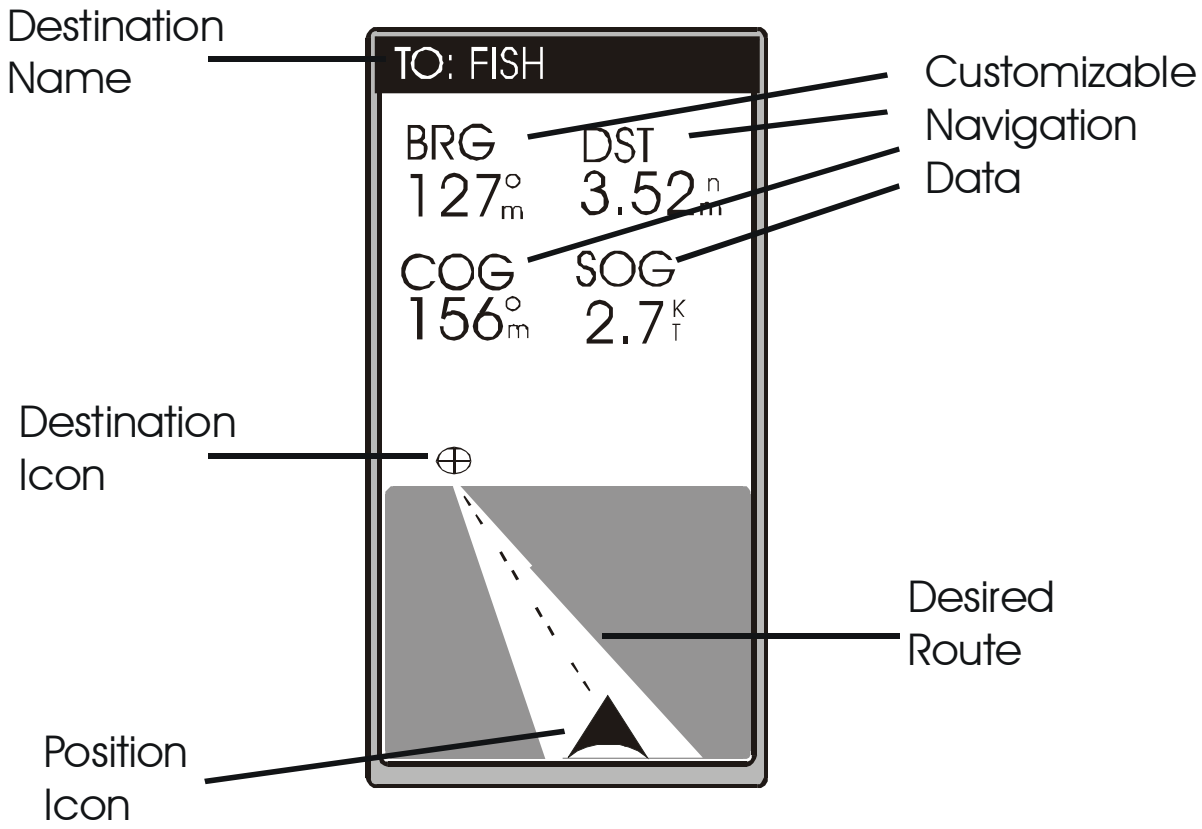
The second navigational screen shows customizable navigation information…again, useful for "finding" way points or landmarks that have been chosen as destinations.

Plot Screen



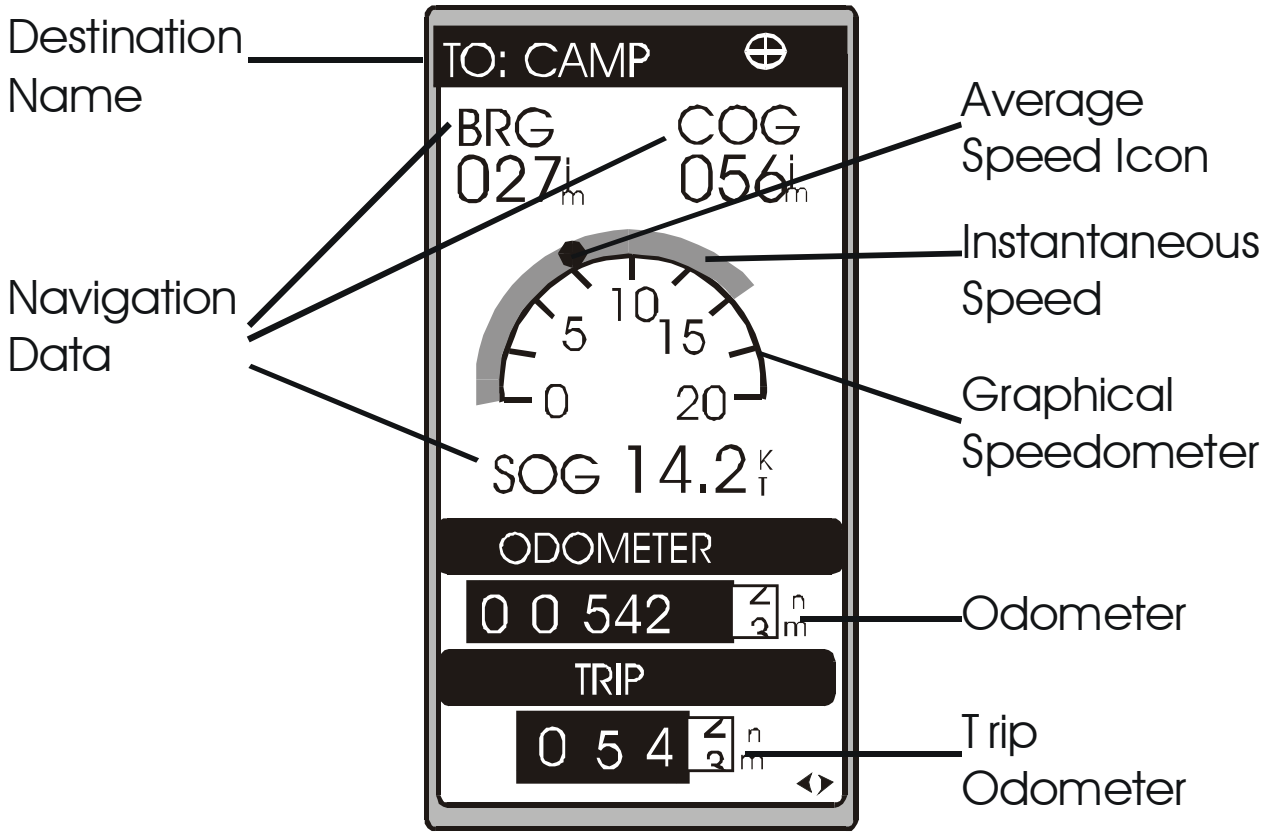
The plot screen shows the most recent path or "bread crumb" track of a person underway. Useful for viewing one's general path, and for finding a selected destination.

Road Screen



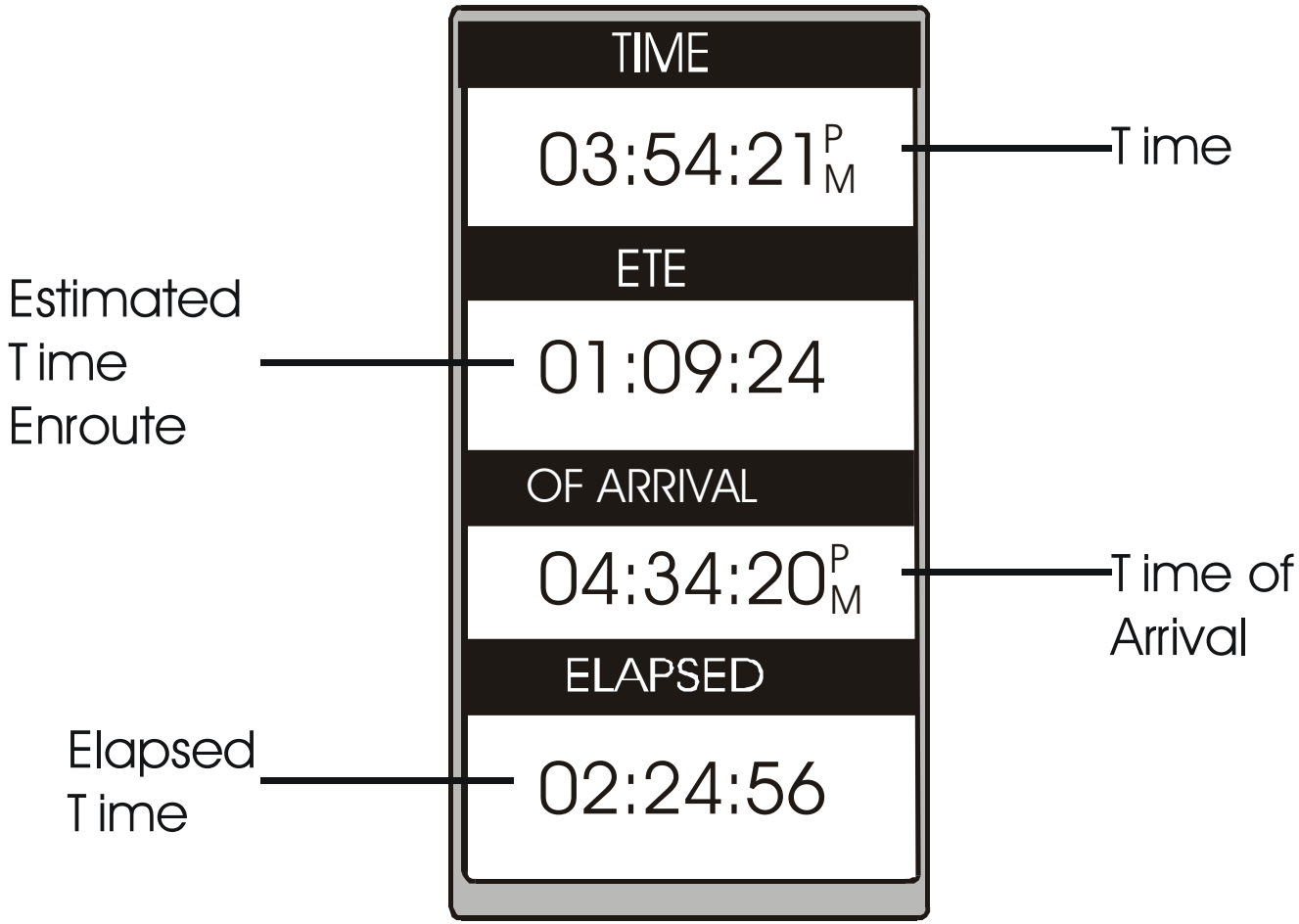
The road screen shows still more customizable navigation information…useful for "finding" way points or landmarks that have been chosen as destinations.

Speed Screen



The speed screen provides information about the distance traveled on a particular track, the average, and the instantaneous speed.

Time Screen

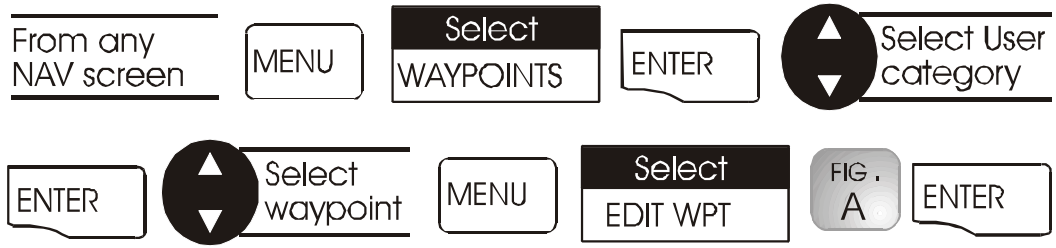


The time screen (not usually shown) provides information regarding time of day, elapsed time, and estimated time of arrival.

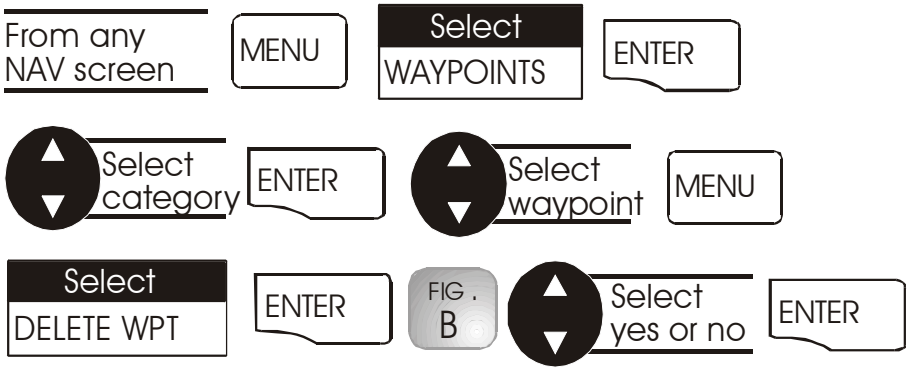
Working with Landmarks

Creating a landmark:

Editing a landmark:



Deleting a landmark:



Using the GPS to Find Landmarks

The 315 has a "GoTo" function that allows a landmark to be selected, and then this landmark becomes the destination. Once selected, every navigational screen will point to that landmark as the destination.

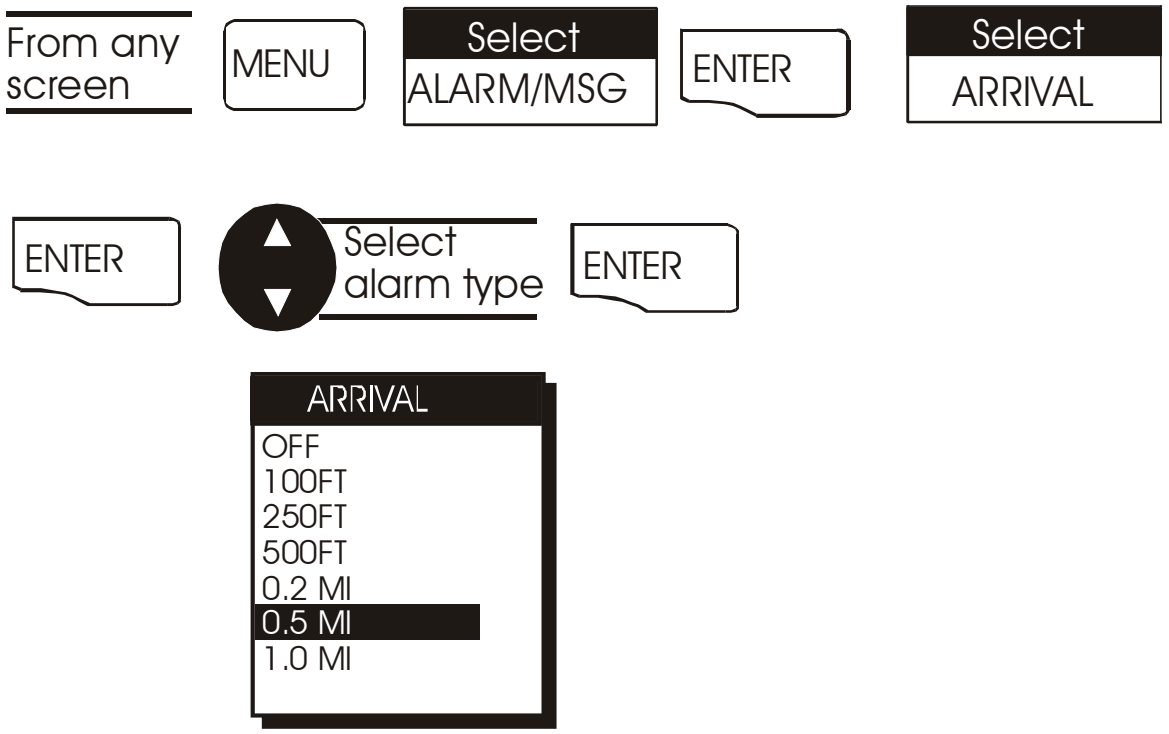
Creating a destination:

Clearing a destination:

Setting Arrival Alarms

Using arrival alarms, the 315 will provide audio and visual cues to indicate that the unit is within a set distance of the destination point.

Setting an arrival alarm:



Working with Track Points

The 315 has a "track history" function that automatically records where one has been by logging "bread crumbs" or track points. Taken together, these track points form a track that is plotted on the Plot screen.

Clear track history:

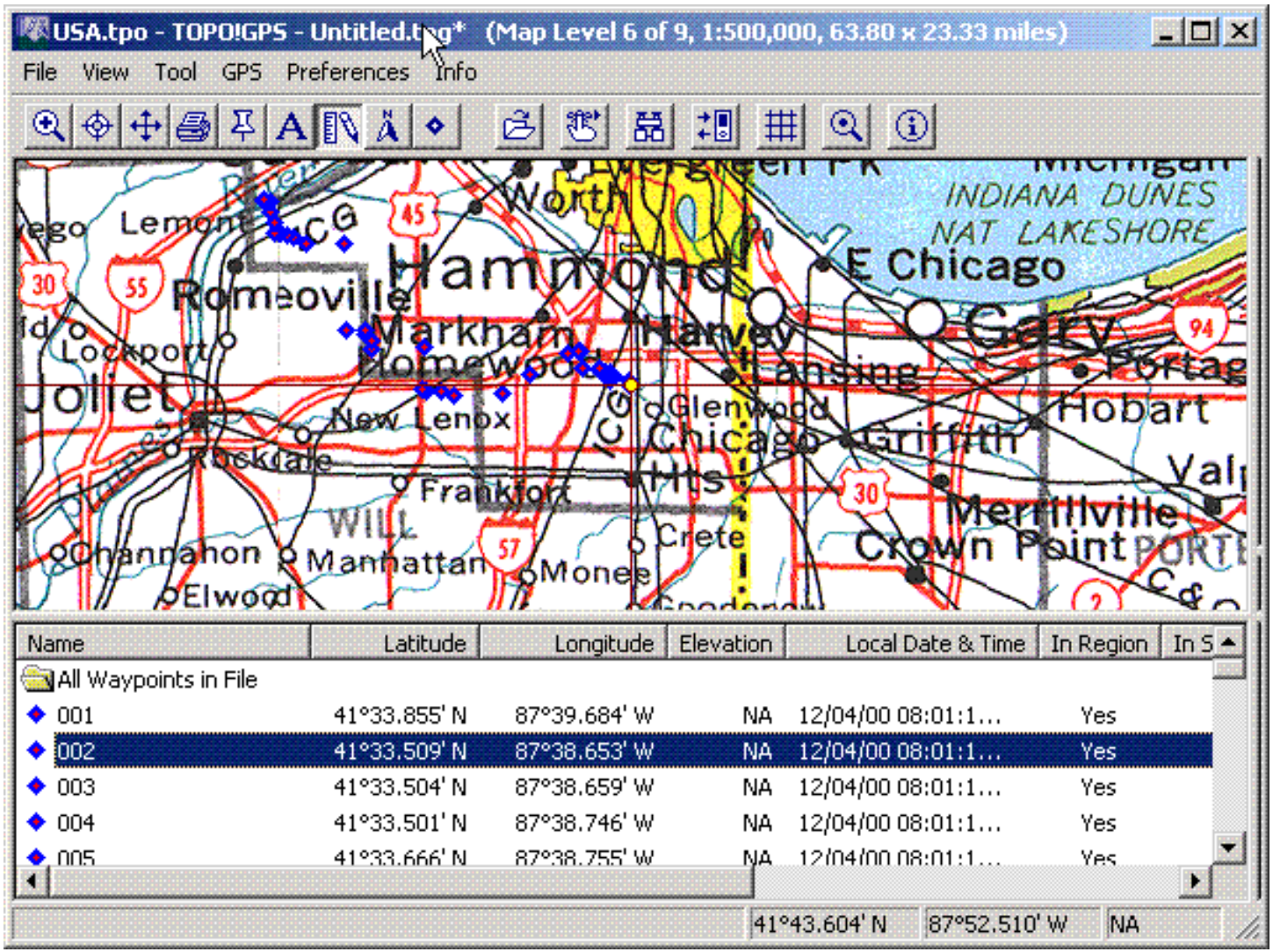
Turn track history "on":

"Save" track history:

Up-Loading and Down-Loading GPS Information

- Requires unit, connection cable ($40), and supporting 3rd party software (i.e., TopoGPS - $30);
- Connect cable to unit and to available serial port;
- Follow instructions within TopoGPS for uploading and downloading tracks, landmarks and routes to and from the unit;
- TopoGPS also allows saving these data to text or ASCII file formats for other use, and allows for reading these files as well (i.e., Excel, ArcView, Access, etc.).

TopoGPS


USA.tpo - TOPO!GPS - Untitled.tpg* (Map Level 6 of 9, 1:500,000, 63.80 x 23.33 miles)
File View Tool GPS Preferences Info
INDIANA DUNES NAT LAKESHORE
Hammond
Romeoville
Markham
Homewood
Harvey
E Chicago
Gary
Hobart
Lansing
Lemont
Worth
Lockport
Joliet
New Lenox
Glenwood
Chicago Hts
Crete
Frankfort
Manhattan
Monee
Elwood
Crown Point
Merrillville
Name Latitude Longitude Elevation Local Date & Time In Region
All Waypoints in File
001 41°33.855' N 87°39.684' W NA 12/04/00 08:01:1... Yes
002 41°33.509' N 87°38.653' W NA 12/04/00 08:01:1... Yes
003 41°33.504' N 87°38.659' W NA 12/04/00 08:01:1... Yes
004 41°33.501' N 87°38.746' W NA 12/04/00 08:01:1... Yes
005 41°33.666' N 87°38.755' W NA 12/04/00 08:01:1... Yes
41°43.604' N 87°52.510' W NA

For Further Information…

- Trimble, Inc. (http://www.trimble.com/gps/index.htm);
- Garmin, Inc. (http://www.garmin.com/aboutGPS/);
- Magellan, Inc. (http://www.magellangps.com/frames/frame1.htm);
- Lowrance, Inc. (http://www.lowrance.com/outdoor/gpsguide/default.asp);
- Topcon, Inc. (http://www.topcon.com/);
- GPS Novice Network (http://bluegrass.net/%7Ehal/index.html);
- Maps, Compasses and GPS's 101 (http://www.gpsnuts.com/myGPS/GPS/Tutorials/Maps/maps.htm);
- How Stuff Works (http://www.howstuffworks.com/gps.htm);